25

30

5

10

WHAT IS CLAIMED AS NEW AND IS INTENDED TO BE SECURED BY LETTERS PATENT IS:

An electrolyte membrane comprising:

- a precursor membrane, plasma treated in an oxidizing atmosphere, and grafted with a side chain polymer, wherein said side chain polymer comprises at least one proton conductive functional group.
- 2. The electrolyte membrane of Claim 1, wherein the precursor membrane comprises a polymer.
- 3. The electrolyte membrane of Claim 2, wherein the polymer is at least one polymer selected from the group consisting of polyethylene, polypropylene, polyvinylchloride, polyvinylidenedichloride, polyvinylflouride, polyvinylidenedifluoride, polytetrafluoroethylene, ethylene-tetrafluoroethylene copolymer, tetrafluoroethylene-perfluoroalkylvinylether copolymer, and tetrafluoroethylene-hexafluoropropylene copolymer.
- 4. The electrolyte membrane of Claim 1, wherein the side chain polymer is a hydrocarbon polymer to which at least one proton conductive group has been introduced.
- 5. The electrolyte membrane of Claim 1, wherein the side chain polymer comprises at least one monomer having a proton conductive functional group.
- 6. The electrolyte membrane of Claim 4, wherein the hydrocarbon polymer is at least one side hydrocarbon polymer selected from the group consisting of poly(chloroalkyl styrene), poly(α -methyl styrene), poly(α -fluorostyrene), poly(α -fluoros
- 7. The electrolyte membrane of Claim 5, wherein the side chain polymer is selected from the group consisting of polyacrylic acid, polymethacrylic acid, poly(vinyl alkyl sulfonic

- 8. The electrolyte membrane of Claim 1, wherein the proton conductive functional group is a sulfonic acid group.
- 9. The electrolyte membrane of Claim 3, wherein the proton conductive functional group is a sulfonic acid group.
- 10. The electrolyte membrane of Claim 6, wherein the proton conductive functional group is a sulfonic acid group.
- 11. The electrolyte membrane of Claim 1, wherein the precursor membrane comprises an ethylene-tetrafluoroethylene copolymer, the side chain polymer comprises polystyrene, and the proton conductive functional group is sulfonic acid.
- 12. The electrolyte membrane of Claim 1, wherein the precursor membrane comprises polyvinylidenedifluoride, the side chain polymer comprises polystyrene, and the proton conductive functional group is sulfonic acid.

13. A method of producing an electrolyte membrane comprising:

preparing a precursor membrane comprising a polymer which is capable of being graft polymerized;

exposing the surface of the precursor membrane to a plasma in an oxidative atmosphere;

graft-polymerizing a side chain polymer to the plasma treated precursor membrane; and

introducing a proton conductive functional group to the side chain.

14. The method of Claim 13 wherein the precursor membrane comprises a polymer.

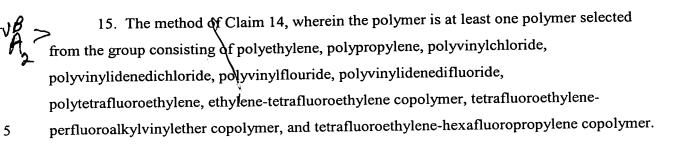
25

5

10

25

30



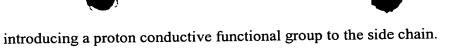
- 16. The method of Claim 13, wherein the side chain polymer is a hydrocarbon polymer to which at least one proton conductive group can be introduced.
- 17. The method of Claim 16, wherein the hydrocarbon polymer is at least one hydrocarbon polymer selected from the group consisting of poly(chloroalkyl styrene), poly(α -methyl styrene), poly(α -fluorostyrene), poly(α
- 18. The method of Claim 13, wherein the proton conductive functional group is a sulfonic acid group.
- 19. The method of Claim 15, wherein the proton conductive functional group is a sulfonic acid group.
- 20. The method of Claim 17, wherein the proton conductive functional group is a sulfonic acid group.
- 21. A membrane made by a process comprising:

 preparing a precursor membrane comprising a polymer which is capable of being graft polymerized;

exposing the surface of the precursor membrane to a plasma in an oxidative atmosphere;

graft-polymerizing a side chain polymer to the plasma treated precursor membrane; and

5



- 22. An electrochemical cell comprising the electrolyte membrane of Claim 1.
- 23. The electrochemical cell of Claim 22 which is a fuel cell.